North Coast Hydrologic Region

Setting

The North Coast Region comprises a diverse area, including redwood forests, inland mountain valleys, and the semi-desert-like Modoc Plateau. Much of the region is mountainous and rugged. Heavy rainfall makes the region the most water-abundant area of California, producing about 41 percent of the State's total natural runoff.

Forest and rangeland represent about 98 percent of the land area of the region. The major land uses in the North Coast Region are timber production, agriculture, fish and wildlife propagation, parks, recreation and open space. Most urban development is in the Santa Rosa, Ukiah and Eureka areas. Many of the region's watersheds support listed species of plants and animals, and many North Coast streams and rivers support anadromous fish runs. The principal reaches of the Klamath, Eel, and Smith Rivers have been designated wild and scenic under federal and State law and therefore are protected from large scale water development.

Communities and rural areas are generally supplied by small local surface and groundwater systems. Larger water supply projects include the Bureau of Reclamation's Klamath Project, the Army Corps of Engineers' Russian River Project, and the Humboldt Bay Municipal Water District's Ruth Reservoir and Eureka to McKinleyville distribution system. Supplies from the largest reservoirs in the region, the Central Valley Project's Clair Engle Lake and the USCE's Lake Sonoma near Geyserville, were built as export projects to adjacent hydrologic regions. Many groundwater wells rely on hydrologic connection to the rivers and streams of the valleys. Along the coast valleys, most "groundwater" is developed from shallow wells installed in the narrow river terraces adjacent to the river and streams.

The following water balance table provides a summary of detailed regional water accounting contained in Volume 2. As shown in the table, precipitation and inflow from Oregon constitute almost all the water entering the region. Most of the water used in the region is for required outflow to the ocean; there is a relatively small amount of "additional ocean outflow" that could be appropriated for other uses.

State of the region

The North Coast Region generally has good water quality that adequately supports the beneficial uses of its water bodies. Nonethe-

Figure X. Map of the North Coast Hydrologic Region can be found on page 4-16. When the digital version is completed, the reader will be able to click on this map for a full-page view.

WATER BALANCE SUMMARY – TAF

Water Entering the Region - Water Leaving the Region = Storage Changes in Region

(See Volume 2 for Details)	1998 (wet)	2000 (average)	2001 (dry)
Water Entering the Region			
Precipitation	79,216	50,755	31,254
Surface Inflow from Oregon	2,030	1,498	988
Imports from Other Regions	337	411	255
Total	**81,583**	**52,664**	**32,497**
Water Leaving the Region			
Consumptive Use of Applied Water * (Ag, M&I, Wetlands)	641	778	666
Exports to Other Regions	863	1,111	669
Outflow to Oregon	99	114	66
Required Outflow to Ocean	34,841	18,761	8,111
Additional Outflow to Ocean or Salt Sink	110	127	131
Evaporation, Evapotranspiration of Native Vegetation, Groundwater Subsurface Outflows, Natural and Incidental Runoff, Ag Effective Precipitation & Other Outflows	44,348	32,347	23,814
Total	**80,902**	**53,238**	**33,457**
Storage Changes in the Region [+] Water added to storage [-] Water removed from storage			
Change in Surface Reservoir Storage	703	-246	-491
Change in Groundwater Storage	-22	-328	-469
Total	**681**	**-574**	**-960**
Applied Water * (compare with Consumptive Use)	1,164	1,321	1,041

* Definition - Consumptive use is the amount of applied water used and no longer available as a source of supply. Applied water is greater than consumptive use because it includes consumptive use, reuse, and outflows.

Figure X. Water Balance Summary of the North Coast Hydrologic Region can be found on page 4-15. When the digital version is completed, the reader will be able to click on this for a full-page view.

Example Multipurpose Project

The Arcata Integrated Wastewater Treatment Facility and Marsh and Wildlife Sanctuary are located in the City of Arcata at the north end of Humboldt Bay in northern California. Arcata's Wastewater Treatment Facility uses a unique approach to wastewater treatment that includes wetland wastewater treatment, wetland enhancement and salmon ranching. The project uses a marsh system to provide secondary treatment for the City's wastewater, wildlife habitat and passive public recreation. The marshes are part of the 154-acre Arcata Marsh and Wildlife Sanctuary that includes two additional wetland restoration projects. There is also a small fish-rearing operation at the treatment plant that utilizes treated sewage. The aquaculture facility is operated by Humboldt State University under a cooperative agreement with the City.

less, the North Coast is confronted by several water quality problems. The Regional Water Quality Control Board's priorities highlight control of nonpoint source runoff from logging, rural roads, agriculture and cities, especially when such runoff causes erosion and sedimentation that damages anadromous fish habitat. Sediment, temperature and nutrients are nearly the sole focus of the region's 303(d) list of impaired water bodies. The Eel, Mad and Trinity Rivers are all adversely affected by sedimentation.

Even though the North Coast Region produces a substantial share of California's surface water runoff, only about 10 percent of this runoff occurs in the summer months and water supplies are limited throughout much of the area. Small surface water supply projects generally have limited carryover capacity that cannot supply adequate water during extended months of low rainfall. Ranney collectors (shallow horizontal wells generally along the banks or under the bed of rivers) supply the drinking water for many of the communities on the North Coast, such as Smith River, Crescent City, and Humboldt Bay area. These "wells" are under the direct influence of surface water, and require treatment.

The Town of Mendocino typifies the problems related to groundwater development in the shallow marine terrace aquifers; surveys in the mid-1980s indicate that about 10 percent of wells go dry every year and up to 40 percent go dry during drought years. The City of Willits has had chronic problems with turbidity, taste and odor with water from Morris Reservoir, and high arsenic, iron and manganese levels in their groundwater supply. Regional groundwater quality problems include seawater intrusion and nitrates in shallow coastal groundwater aquifers, salinity and alkalinity in the lake sediments of the Modoc Plateau basins and iron, boron and manganese in the inland basins of Mendocino and Sonoma counties.

The legal action having the greatest impact on North Coast water supplies for additional water for fish and wildlife is the 1991 decision by the Secretary of Interior to increase instream flow releases to the Trinity River below Lewiston Dam from 140,000 AF/Yr to 340,000 AF/Yr during critically dry years. The result of this decision was an increase in Trinity River fishery habitat and a decrease in water supply to the Sacramento River. The results of a current study and a final decision for modifying the Trinity River instream flow schedule for other year types is pending and may be finalized in 2003.

The primary water management issue in the Klamath River Basin is the restoration of fish populations that include listed species such as the Lost River and shortnose suckers, Coho salmon and steelhead trout and the

impacts on local agriculture. The modified operation of the Klamath Project to accommodate the needs of the listed suckers has reduced the river flows that are critical to salmon and steelhead survival in the middle and lower Klamath. Since 2001, the operations for fisheries water requirements also reduced deliveries to Project farmers. Water supply implications of the Coho and steelhead listings will not be known until management plans are completed and recovery goals are established.

Looking to the future

Present water supplies and modest expansion of local water sources will generally be adequate to meet the region's expected municipal and industrial demands over the next 30 years. The Humboldt Bay Municipal Water District system may ultimately expand to serve the Trinidad-Moonstone area which is experiencing local water deficiencies. The Eureka-Arcata area is facing possible construction of a regional water treatment plant and is investigating groundwater development as an alternative source, which would not require treatment. Crescent City has an adequate supply from the Smith River but needs to increase system transmission and storage capacity and may also be facing construction of a water treatment facility. The city of Rio Dell may also be facing construction of a surface water treatment facility. Ranney wells will be installed in the Eel River as a primary water supply for Rio Dell. Trinity County Waterworks District No. 1, which serves the town of Hayfork from the 800-AF Ewing Reservoir, has plans to enlarge the reservoir and expand its surface water system.

A major land restoration project to reduce sediment production to restore fishery habitat is ongoing in the Grass Valley Creek watershed near Lewiston. Sediment production from this tributary to the Trinity River has been greatly reduced using funding from the Trinity River Fish and Wildlife Restoration program. To date the Buckhorn Mountain control dam and several lower creek and river sediment catchment pools have been constructed. In addition, revegetation of this heavily damaged watershed is ongoing. The Trinity River Task Force is investigating a basin-buy-out proposal for Grass Valley Creek watershed for prevention of future soil disturbances.

To address the need for greater certainty in project operations, USBR began preparing a long-term Klamath Project operations plan in 1995, but difficult and complex issues have delayed completion of the long-term plan. USBR has issued an annual operations plan each year since 1995 as it continues the development of a long-term plan. The Klamath

River Compact Commission is facilitating discussions on water management of interstate water resources and plans to promote intergovernmental cooperation on water allocations issues. A few additional wells are expected to augment irrigation supplies in the Butte Valley — Tule Lake area. Pressure for additional groundwater development in areas like Scott and Shasta Valleys will be greater since the 2002 listing of the Coho salmon. The new listing, along with stricter applications of DFG code regulations will reduce the supplies available for irrigation from existing water developments and from natural runoff.

Most Northern California counties lack the resources and funding to assist them with regional or local plans. With continued budget constraints and limited resources, requests for more detailed information, necessary for resolving county, regional and state water issues and concerns will more than likely increase. DWR could assist in providing the needed data and analysis for locals and regional planning.

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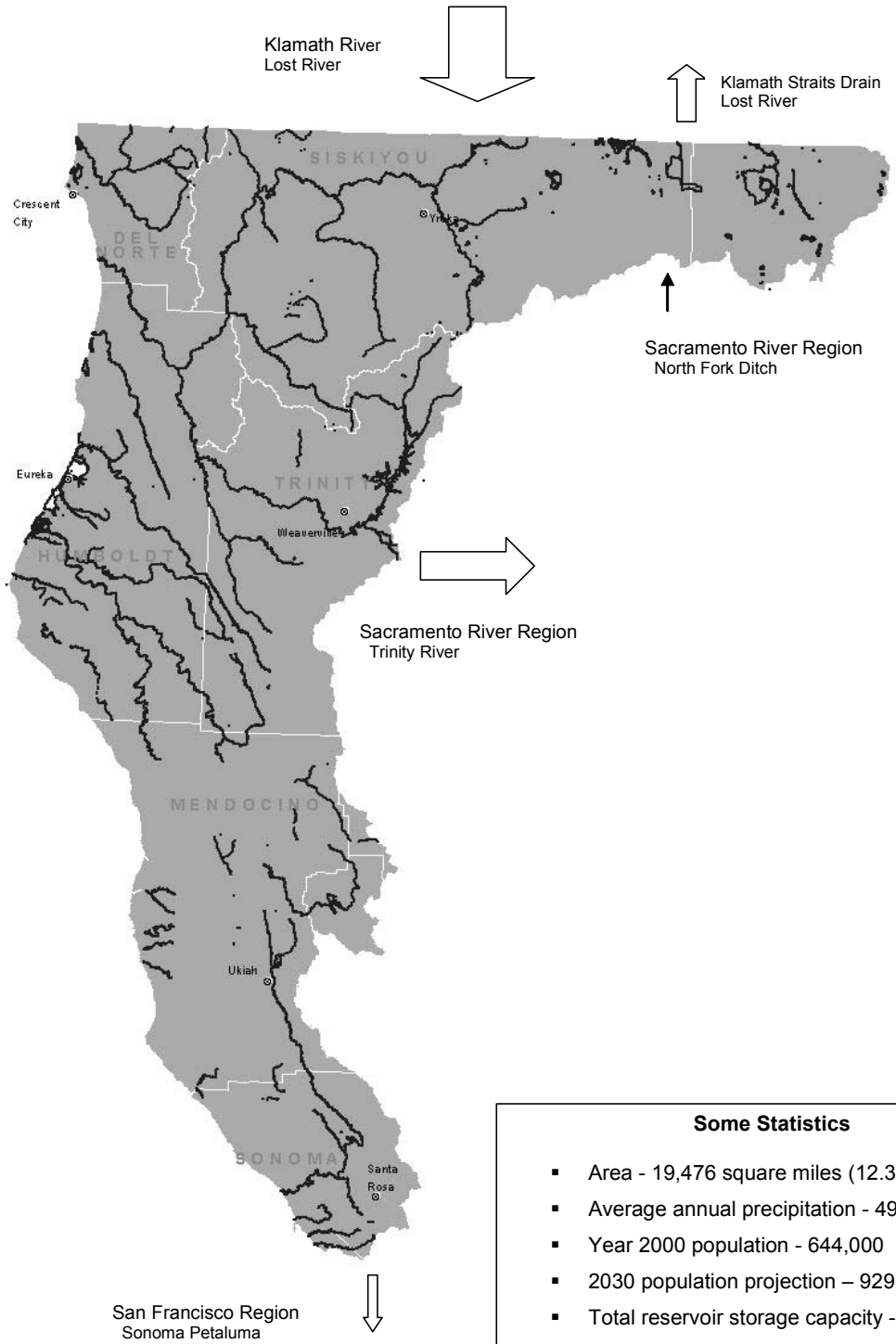
NORTH COAST HYDROLOGIC REGION



Some Statistics

- Area - 19,476 square miles (12.3% of State)
- Average annual precipitation - 49 inches
- Year 2000 population - 644,000
- 2030 population projection – 929,900
- Total reservoir storage capacity - 3,780 TAF
- 1995 irrigated agriculture - 291,800 acres